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Bioremediation of oil spills in soil

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Oil spillage can cause a critical environmental impact on soil. Thus, many technologies have been developed for treating land contaminated by petroleum products. In this project, crude oil contaminated soil will be treated by bioremediation using oil-utilizing bacterial consortium. The bacterial consortium will be isolated from the crude-oil contaminated soil samples, and the best hydrocarbons degrading organisms will be selected for developing the bioremediation process. Water sludge with known composition will be used as nutrient source for the degradation process. The highest growth and hydrocarbon-degradation rate bacteria with the optimum process parameters will be used for the design of the bioremediation process.

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In-situ method to monitor surface reaction / oxidation at high temperature

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The formation of external Cr_2O_3 scale is important to obtain the oxidation resistance of Fe-Cr alloys at high temperatures. It is well known that the critical concentration of Cr to form protective external scale of Cr_2O_3 in humid condition is higher than that in dry condition, and the criterion of this concentration is expressed as Wagner's equation. To determine this concentration experimentally, a lot of mass gain data and metallographic surveys are required. An in-situ method of continuous monitoring of surface oxygen potential by oxygen concentration cell using stabilized zirconia has been developed and applied to the oxidation of Fe-Cr alloy in order to check the protectiveness of the scale. In our previous work, the oxygen chemical potential on growing oxide scales during high temperature oxidation of Fe, Ni, and Co were successfully measured. In this study, the surface oxygen potentials of Fe-0~17 wt% Cr alloys in Ar-21% O_2 gas as dry condition and Fe-10~22 wt% Cr alloys in Ar-20% O_2 -20% H_2O gas as humid condition were measured at 1073 K up to 20 ks.

In dry condition, the surface oxygen potentials of Fe with more than 10 wt% Cr alloys were close to the oxygen potential of atmosphere immediately after the heating period. It indicates that protective Cr_2O_3 scale formed on these alloys at early stage of oxidation. However, the surface oxygen potentials of these same composition alloys were lower in humid condition than that in dry. By this method, the protectiveness of scales formed on Fe-Cr alloys can be evaluated in-situ in a few hours.

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Molecular Characterization of Malaysian Ginger (*Zingiber officinale* Rosc.)

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The genetic polymorphisms among *Zingiber officinale* Rosc. (= halia) from Bukit Tinggi (BT), Tanjung Sepat (TS and Sabah (SB) cultivars of were studied using a single microsatellite oligo-primers: (CATA)5, (GATA)5 and (GAC)6 as DNA molecular markers in the polymerase chain reaction (PCR). Seven polymorphic bands were obtained from the PCR products, with in average about 2.334 polymorphic bands per primer, leading to a polymorphic rate of 17.9 %. Jaccard's coefficient of similarity varied from 0.562 to 0.875, indicative of close genetic relatedness among the genotype studied. UPGMA clustering indicated that the BT ginger cv. more related genetically to the TS cv. compared to the SB ginger. A putative new gene was observed from the DNA sequencing of the polymorphic bands of TS